

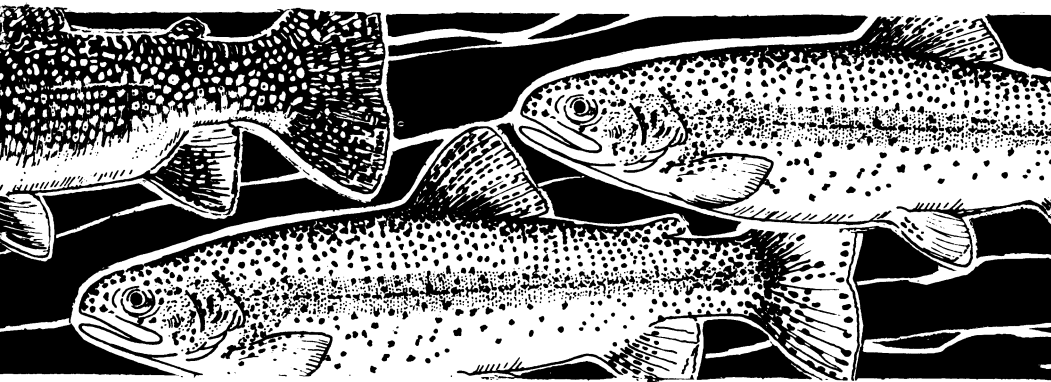
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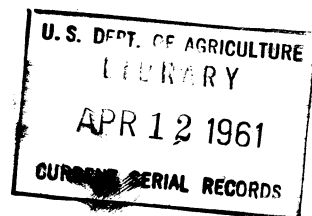
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TROUT

**IN
FARM**



**AND
RANCH PONDS**



Farmers' Bulletin No. 2154

U.S. DEPARTMENT OF AGRICULTURE

Trout are now being grown in more and more farm and ranch ponds in the cooler parts of the United States. Trout from these ponds are fast growing and, surprisingly enough, are firm and equal in flavor to the best trout from streams and mountain lakes.

This bulletin tells how to plan and manage farm and ranch ponds to grow trout for food and recreation and lists some essentials for commercial production.

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TROUT

IN FARM AND RANCH PONDS

BY ADREY E. BORELL and PAUL M. SCHEFFER, *biologists,*
Soil Conservation Service

Contrary to popular belief, trout do not require fast-running streams and mountain lakes, but live and grow rapidly in most cool or cold-water farm and ranch ponds.

Some of these ponds are built primarily to provide water for livestock. Well-placed ponds lead to more uniform use of range and pasture. Many farm and ranch ponds are built to store and make better use of irrigation water; others aid in the control of erosion and floodwaters. And some are built primarily for fish, for waterfowl, or for other wildlife.

Regardless of the primary use, most conservation ponds have important secondary values. Many provide fishing, duck shooting, and fur trapping for the farmer or rancher, his family, neighbors, and city friends. They offer rural recreation in the form of swimming and boating.

Ponds also provide drinking water for upland game birds and big game animals. They are resting places for migratory waterfowl. In the northern half of the United States, a farm pond may produce one or more broods of ducks. Also, mink, muskrats, raccoons, cottontails, doves, pheasants, and quail use ponds and the area around them.

The pond and its immediate surroundings have an attraction for young and old. For boys and girls the frogs, turtles, dragon flies as well

as the water itself have a fascination greater than any other area on the farm or ranch. This value may be close to the top of the list.

Geographical Range

Ponds above 5,000 feet in the West are usually cool enough for trout. In the fog belt of the Pacific Coast, in the northern tier of States, in the Appalachians, and in the New England States, trout thrive in ponds at lower elevations. Ponds at any elevation or in any latitude, fed by cold springs or cold-water wells, may be suitable.

Temperature Range

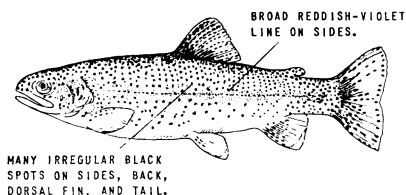
Trout grow best in water of 55° to 68° F., but will survive a slightly wider temperature range.

If the water in your pond does not get warmer than 70° F. 6 inches below the surface of the deep water it probably will be cool enough for trout. Even though the surface water and the shallow water reach 75° to 80° F. in midday, the deeper water may be cool enough.

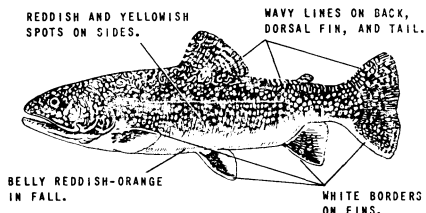
Water that is too cold slows the growth of trout. Cold water produces less trout food, and trout do not feed as well in very cold water. For example, where mountain-pond waters seldom go above 50° F., the trout in them grow slowly.

On the other hand, water that is

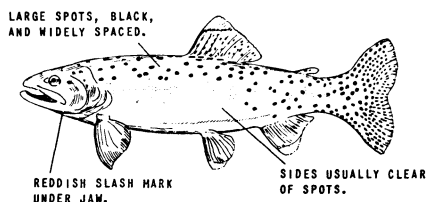
RAINBOW



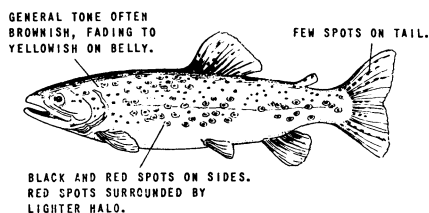
BROOK



CUTTHROAT



BROWN



Each kind of trout has special markings that identify it.

Water current moves debris toward the top of the grate where it is easily removed with a rake. Spacing of the rods determines the size of fish that will be controlled. Setting the rods closer than one-quarter inch apart is usually not practical because of clogging and interference with flow. Your engineer can tell you the width and height of grate necessary for the amount of water entering your pond.

If water is piped from a clear stream, you may be able to bury the intake pipe under 6 inches or more of gravel in the stream bottom and keep out fish of all sizes.

Some States require screening of the inlet if the pond is fed from a stream that contains game fish.

Kinds of trout

Rainbow trout and brook trout are the preferred kinds for farm and ranch ponds.

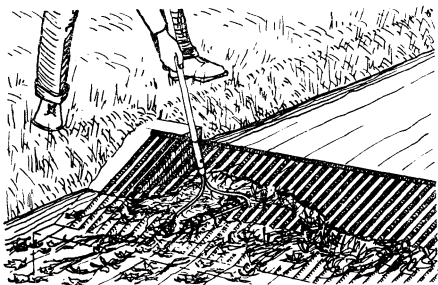
The rainbow trout is preferred west of the Mississippi and in parts of the Southeast. It thrives under a wide range of conditions and grows fast. In the West it is more widely available from hatcheries than are other kinds.

The brook trout is favored in parts of the East. It is a little easier to catch and will sometimes spawn in springs or trickles that do not suit the rainbow. Brook trout are available from some hatcheries in the West and from most hatcheries in the East.

Stocking rainbow and brook trout together may add variety to your fishing, but will add little to the poundage of trout harvested.

The cutthroat trout has been little used in farm and ranch ponds and is not widely available from hatcheries.

The brown trout will stand a wide



This type grate will control larger fish and is easily cleaned.

range of water conditions, but it is more cannibalistic and harder to catch than the others. We do not recommend brown trout for stocking farm and ranch ponds.

Do not stock other kinds of fish with trout—they compete with trout for food. If your pond has 50 pounds of other kinds of fish, it likely will have 50 pounds less of trout.

Number to stock

The surface area (not volume), fertility and quality of the water, and the length of the growing season determine the carrying capacity of your pond.

Carrying capacity is measured in pounds of fish rather than in numbers—that is, your pond will support more little fish than big ones.

You can't measure the carrying capacity of your pond accurately.

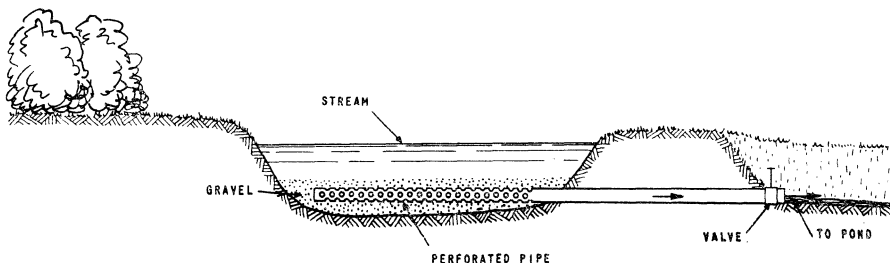
For practical purposes, you don't need to. If your stocking is slightly low, the individual fish will grow faster and nearly as many pounds will be produced in a given time. If your pond is slightly overstocked, the individual fish may not grow so fast but you will get about the same poundage, perhaps more.

Stocking at the rate of 500 to 1,000 advanced fry, or 300 to 600 fingerlings to the surface acre, gives satisfactory results in most fertile ponds. If the pond is infertile, use the lower stocking rate.

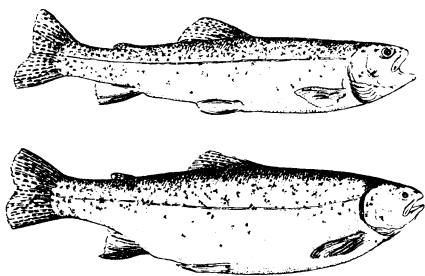
Advanced fry, as used here, are fish 1 to 2 inches long; fingerlings are fish 2 to 4 inches long. Since fewer fry than fingerlings survive, you need to start with more fry than fingerlings.

If you stock at these rates and conditions are favorable, your trout should grow about 1 inch a month until they are 9 to 10 inches long.

You can stock eating-size trout at rates of 100 to 300 trout per surface acre. If you stock more than 100 pounds per surface acre and depend on natural food only, you likely will get little growth until some fish die or have been caught. Stocking large fish is a quick way to get fishing, but it is expensive compared to stocking with advanced fry or fingerlings.



A gravel filter may be used to keep wild fish out of your trout pond.



If not overstocked, trout from farm and ranch ponds will be heavy bodied like the one on the bottom.

Restocking

Trout rarely reproduce in ponds. Therefore you will need to restock at least every second year. If you restock every year you will catch more fish and more pounds of fish each year, but they will average smaller.

If your pond has been fished hard and the population reduced so that there is plenty of food, the remaining trout usually will eat few of the newly stocked fingerlings.

It is best to do your restocking in late summer or fall after most of the larger trout have been fished out. Of course you may need to adjust your stocking date because of the water temperature or the time that fish of the desired size and kind are available in your area.

To avoid the possibility of cannibalism, some pond owners prefer to remove all large trout before restocking with fingerlings.

Where to get trout for stocking

In most of the cooler parts of the United States you can buy trout for stocking from private hatcheries. The cost at the hatchery starts at about \$15 a thousand for advanced fry. Fingerlings up to 4 inches sell for 1 to 3 cents per inch. You can get larger sizes for a dollar or more a pound.

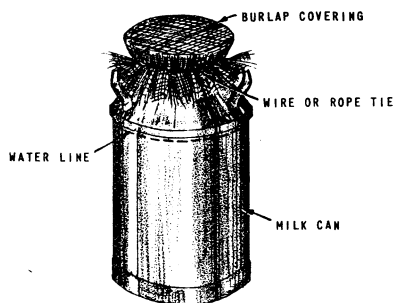
Hatcheries usually make a delivery charge, but you may be able to transport your own fish. You can haul advanced fry or fingerlings in milk cans or clean barrels 200 miles or more if you keep moving so as to splash and aerate the water. Avoid the overuse of ice. Have the water in your transportation cans no more than 10 degrees above or below the water in your pond. Cover your cans with burlap, never with tight metal lids. Hatchery personnel will tell you how many cans to use and how to maintain oxygen during transportation.

Stocking your pond and keeping it stocked is not a big expense. At \$40 per 1,000 for small fingerlings, it would cost about \$20 per surface acre to stock your pond and the same amount annually to keep it stocked.

Your State fish and game agency or Soil Conservation Service technician can give you a list of private hatcheries that sell trout for stocking.

In some States the U.S. Fish and Wildlife Service, cooperating with the State fish and game agency, provides fingerling trout for stocking noncommercial farm and ranch ponds.

In some States you can get trout from your State fish and game agency under various types of agreements regarding public access.



A burlap covering catches the splash and causes dripping which adds oxygen.

Supplemental Feeding

Most pond owners will not need to do any supplemental feeding.

Ponds stocked at rates recommended in this bulletin usually will produce enough fish food for satisfactory trout growth without supplemental feeding. Only in the colder or less fertile ponds might the increased rate of growth, or the greater number of fish that you might be able to stock per acre, justify supplemental feeding.

In theory, you could stock as many fish as you want if you give them enough food. In practice, this doesn't work. Crowded fish are easy prey to disease and parasites.

If you use supplemental feed, it is better to feed every day or at least two or three times a week. Use care not to overfeed. Feed only what the fish will clean up promptly. If food is there 15 minutes after feeding, you are overfeeding.

Decomposing food uses oxygen and may cause loss of fish. If the water in your pond is above 65° F., it is safest to do no supplemental feeding.

Several commercial pellet-type fish foods are now on the market. You can get them from many of the larger milling companies.

Feeding makes the fish tamer and, therefore, easier to catch. This may be an advantage or disadvantage according to your desire and fishing skill.

Harvesting Your Fish Crop

If your pond is a good one, it should produce 50 pounds of trout per acre each year without supplemental feeding. It may produce more.

To get the greatest returns in numbers of eating-size trout and in

poundage, start fishing as soon as the trout are 6 to 8 inches long. About a year after stocking with fingerling trout, the total poundage of trout in your pond usually reaches carrying capacity, and growth slows almost to a stop. From then on, in most ponds, the number and total poundage decreases. This is because natural mortality removes fish and thus reduces poundage faster than can be compensated by growth of the remaining fish.

Only a small percentage of the trout that you stock will live more than 2 years. The longer you leave trout in a pond, the fewer you will have. Three years after stocking, even if you don't do any fishing, you will have only a few large fish. These may be hard to catch and their total weight will be far below the carrying capacity of your pond.

Big trout are fun to catch, but growing big ones in a farm or ranch pond is not an economic goal. Make every effort to remove the big ones.

Trout in farm or ranch ponds usually are easy to catch. You may have the most fun when you fish with flies, spinners, or other artificial lures. However, if you don't have this equipment or casting skill, you can catch your trout with a bamboo pole and bait. Angeworms are a favorite bait; grasshoppers, crickets, and salmon eggs are also good.

You are most likely to catch trout when they are feeding. In warm weather, they feed mostly in the mornings and evenings. In early spring or late fall, when the water is cold, they usually feed during the middle of a sunny day.

Here is a good rule—any time you see trout rising is a good time to go fishing. If trout aren't rising but you still want to fish, try fishing deep.

Don't be afraid to catch your trout. Remember that you can restock.

If you clean trout promptly after catching, then freeze them in water, they will retain their fresh taste for several months. Make sure that the fish are completely encased in ice.

Some States have regulations on size, bag limit, season, and methods of take that apply to farm ponds.

Choosing a Site

Low or seep areas too wet for crops sometimes make good pond sites. A gully may be suitable after conservation measures have been applied to the land. Building a pond in a gully may help to check erosion and at the same time convert an unsightly area into an attractive spot. Good trout ponds have been made by excavating into water-bearing gravels. Some sand or gravel pits and strip-mine pits make satisfactory trout ponds.

Unless you can dig your pond be-

low the water table, look for soil that will hold water well enough to prevent excessive seepage. If seepage is too great, the pond bottom may be sealed with a layer of local clay or with salt or bentonite. Sometimes compaction by machine or by livestock trampling will seal it.

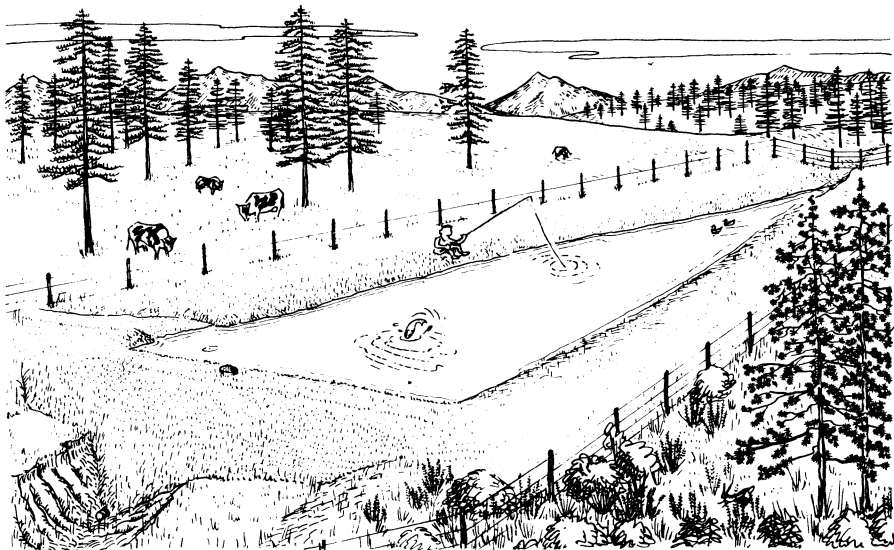
Locate the pond where it will not be flooded or get heavy runoff.

If you have more than one good site, select the one nearest to your house. A pond near the house is more likely to be fished and otherwise properly managed than one farther away.

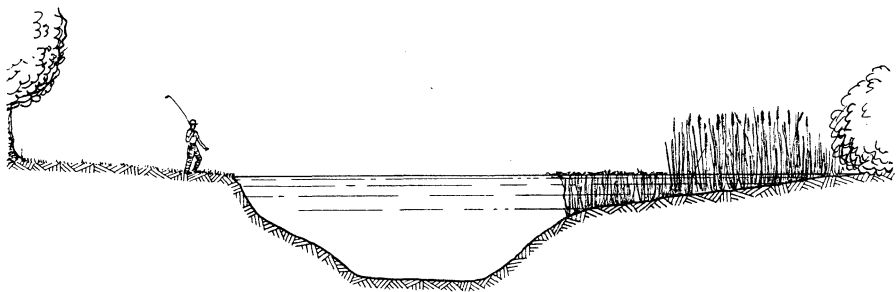
The Soil Conservation Service technician in your local soil conservation district can help with site location and sealing of the pond bottom.

Planning a Trout Pond

A pond built and managed exclusively for trout will produce more than a dual-purpose pond. However, ponds built for other purposes



Ponds can be built in gullies if adequate conservation measures have been applied on the watershed.



The depth of water near the shore determines whether you have weeds or a pleasant bank to fish from.

often provide good fishing and high production. Most ponds built for other purposes can be improved for trout with slight modifications. Such modifications may include reducing shallow water areas; reducing silting; preventing excessive flows of water through the pond; and keeping the water at constant level. Sometimes deepening your pond 3 to 4 feet is all that is needed to make it suitable for trout.

Size

Trout can be raised in a pond of almost any size. But ponds smaller than one-fourth surface acre may be too small to meet a family's fishing needs. One-half to one surface acre makes an ideal family-sized trout pond. Ponds of 1 to 3 acres will provide plenty of fish and fishing for a large family, as well as for neighbors and friends.

If a large water area is needed, such as for clubs, it is usually best to build several ponds of 1 to 5 acres each. Smaller ponds are easier to manage and produce more pounds of fish per surface acre than do larger ones.

The water supply is often the factor that limits size. Base the size of your pond on the average—not the maximum—supply of water.

Even if you have enough water, a small, good pond will give greater satisfaction than a large one not so well built and managed. Keep in mind that a large pond costs more to build and takes more time, effort, and expense to keep properly stocked and free of weeds.

Depth

The depth needed for a trout pond depends largely on climate and water supply.

In areas with hot summers or where ponds freeze over, one-fourth of the pond should be at least 10 feet deep if it is without running water. Depths of from 12 to 16 feet may be necessary in areas with long, cold winters. In climates where little or no ice forms and the summers are cool, or where there is running water, a depth of 6 to 8 feet or less is usually enough.

Even if you have running water and there is no danger of freezeouts, waterweed control is still a problem. In general, the shallower the water, the greater will be the weed growth.

Shore

The shore can make the difference between a pond that is a joy and one that gives constant trouble. The shore of your pond should slope at a

ratio of 3 to 1, or steeper, to a 3-foot depth. Have as little water as possible less than 3 feet deep.

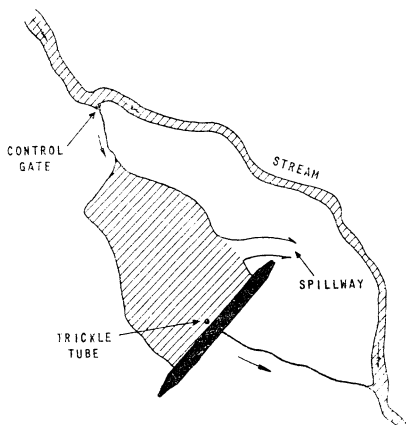
A gently sloping shore results in shallow water which encourages weeds and mosquitoes. A shallow shore also is hard to fish from and increases fish loss to wading birds.

You should remove trees, brush, and other debris from the pond site and for a distance of at least 30 feet back from the water line. This clear space gives room for casting.

Fill marshy spots around the pond with dirt, and seed the bank to locally adapted sod-forming short grass. Grass is attractive and pleasant to fish from and helps control weeds and woody plants.

Landscaping

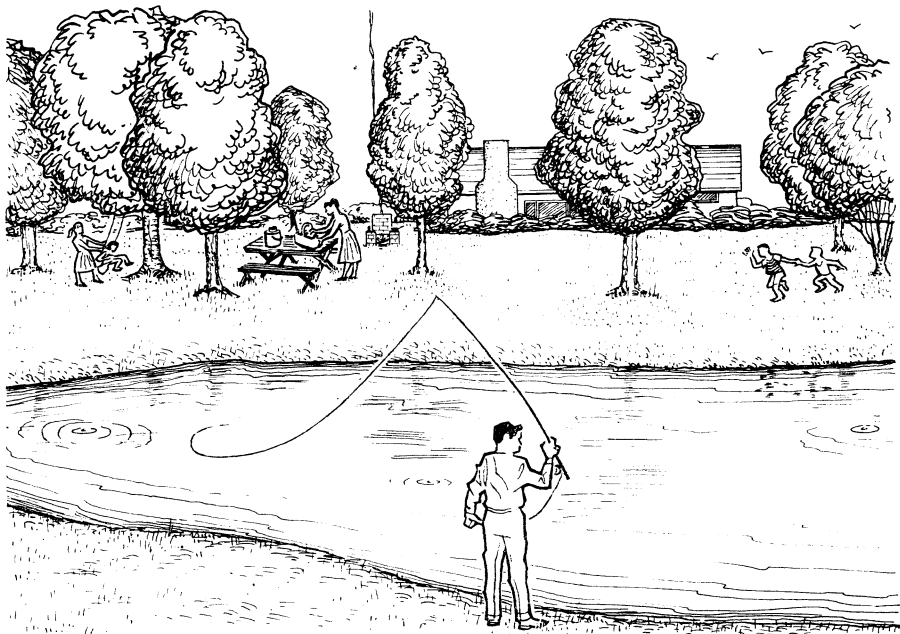
With a little planning, you can make your farm or ranch pond and its surroundings into an attractive



Trout ponds fed by streams should be located off the channel.

spot. It can be an outdoor play area for your family and friends.

Your first steps are proper design of the shore, control of shore weeds, and planting a sod-forming grass on the banks. You may have to mow



A landscaped pond adds beauty to the farm and pleasure to the fishing.

tall-growing vegetation around the pond.

You may want to plant a few shade trees and some evergreens. Clumps of shrubs or a border of shrubs provide cover and nesting sites for game birds and for song and insect-eating birds. You can pump from the pond to irrigate the trees and shrubs if needed.

Do not plant trees or shrubs within 30 feet of the water. They interfere with fishing and shed leaves into the water. The decomposing leaves consume oxygen.

Pond inlet

A pond supplied by runoff, springs, or a stream—which may yield excessive flows—should have controls to divert the water that is not needed. If the water comes from a permanent or intermittent stream, an off-channel site is desirable.

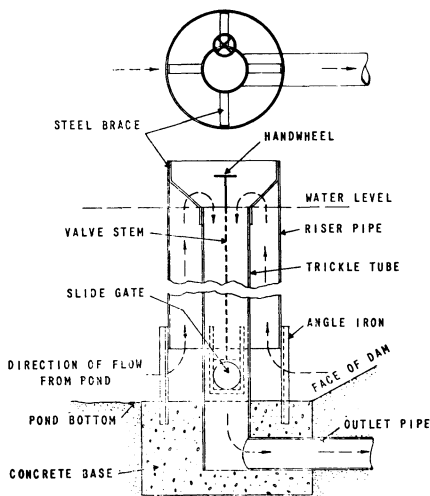
Pond outlet

Unless you can control the flow of water at the inlet, your pond usually will need a trickle tube to take care of the normal flow and an emergency spillway for flood flows. Most ponds need an outlet that provides for complete drainage.

TRICKLE TUBE

Trickle tube is a common name for the pipe spillway that discharges the normal or low rates of flow. It is usually constructed of metal or concrete and normally consists of a vertical section of pipe serving as an inlet that connects with a pipe through the bottom of the dam. Three types are illustrated here.

Type 1 stands in open water. It is a pipe surrounded by a larger pipe. The space between the two pipes



Trickle tube, type 1.

should have at least as much water capacity as the trickle tube. The outside pipe should extend a foot above the top of the trickle tube and down to within 18 inches of the outlet pipe. The outside pipe is held in place at the top by four steel braces placed between the two pipes. The bottom is supported by four steel angle irons set in the concrete foundation on which the trickle tube rests.

This design permits all water flowing through the trickle tube to be drawn from near the pond bottom. It prevents the escape of trout and also prevents the plugging of the trickle tube by beavers or by floating debris.

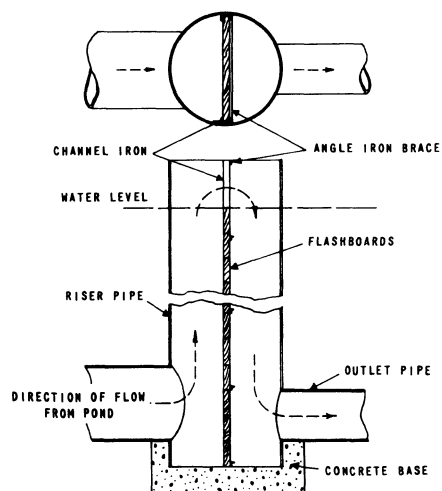
In the colder areas ice is always a hazard to trickle tubes that stand in open water even if protected by posts or supported by a catwalk.

Type 2 is set in the dam. It consists of a large riser pipe set in the dam and divided in the middle by 2-inch flashboards. The flashboards are held in place by two channel irons which are welded on the inside of the riser pipe and extend from the

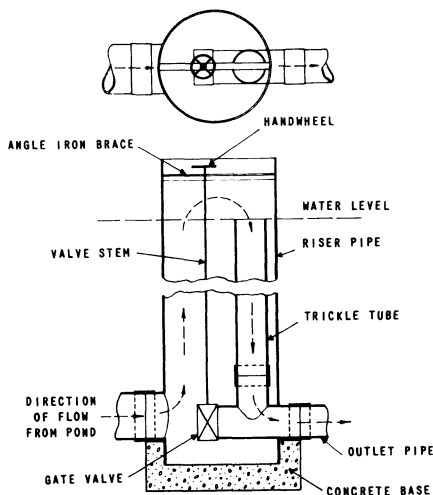
bottom to the top. The water entering the outlet pipe in the bottom of the pond rises to the top of the flashboards, drops down the other side, and flows out through the outlet pipe. A wedge or padlock will keep the top board from floating. Supporting cross braces at 2-foot intervals between the channel irons serve as a ladder. The riser must be at least 36 inches in diameter to permit a man to enter; 40 inches is better.

This design has several advantages. The water level can be adjusted by adding or removing one or more top boards; the pond can be drained by removing all of the boards; water is drawn from the bottom rather than the top of the pond. Since the top of the riser can be covered with planks and earth, you can prevent damage by ice or interference by beavers. Also, if the top is covered, trout are not likely to enter the pipe in the bottom of the pond, swim up through the darkened riser, and go over the top flashboard.

One disadvantage is that you are likely to get some leakage between



Trickle tube, type 2.



Trickle tube, type 3.

the boards. This may be of no concern if you have some permanent flow into the pond.

This design may not be practical if the water against the flashboards is over 10 feet deep. In some States water-storage regulations may not permit this type of design.

Type 3 is also placed in the dam. It is a trickle tube with a drain valve set in a larger riser pipe. This type can be used in ponds of any depth and has all the advantages of the divided riser, except ease of regulating the water level. It has the added advantage of no leakage. And for complete drainage of the pond it is easier to open a valve than to remove flashboards.

DRAINPIPE

Occasionally you may need to drain your trout pond completely to repair the dam, to harvest fish, to clean the pond, or to remove undesirable fish. If your trickle tube does not provide for this you likely will want to install a special drainpipe. Some States require it.

EMERGENCY SPILLWAY

If you build the emergency spillway wider than needed for discharging floodwater, you will lose fewer trout during runoff. This is because the wider spillway results in shallower water—trout have less tendency to swim into 3 or 4 inches of water than into deeper water.

Never screen the emergency spillway. Screened spillways clog with debris and endanger the dam.

The dam

Sound design and construction will prevent leakage, frequent repair, and possible loss of the pond.

You may get engineering help from the Soil Conservation Service through your local soil conservation district or from a private engineer in designing and building a dam that is correct for your soil, topography, and water supply.

Protection From Livestock

As a rule, you should fence trout ponds that are in pastures. Livestock can damage earthfill structures

and pond banks by trampling. Also they may keep the water muddy. You can pipe stock water to a tank outside the fenced area.

Water Supply

Water from runoff, springs, streams, ditches, wells, or seeps can be used for trout ponds.

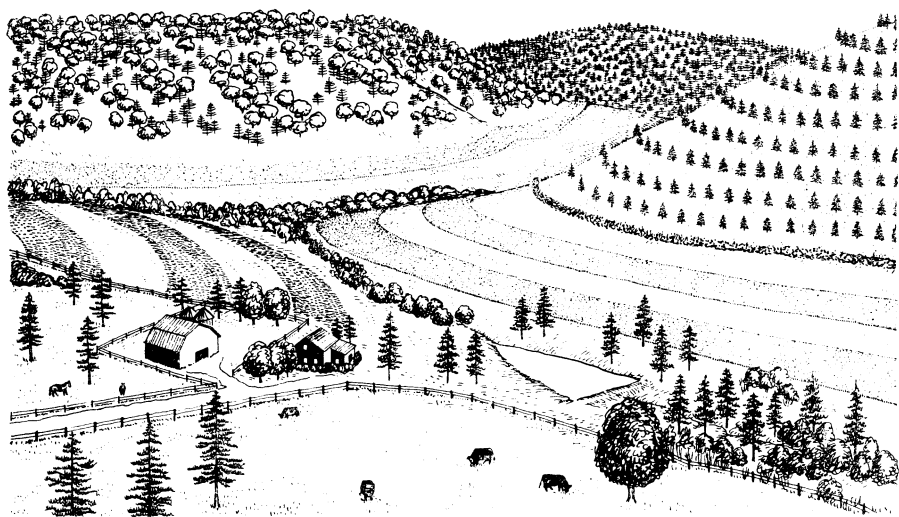
A continuous flow may not be necessary and a heavy flow is rarely desirable. If you have a heavy flow, you may want to reduce it during spring and fall and increase it during summer heat or in winter to provide oxygen under the ice.

The watershed around your pond should have conservation measures applied to prevent erosion and silting. This is essential if your water supply comes from runoff.

Runoff ponds that are filled only two or three times a year and irrigation reservoirs that are drawn down frequently will fluctuate in water level and temperature. This may lower their carrying capacity, but such ponds may still grow some trout.



Keep livestock out of your fishpond.



Conservation measures on the land mean clear water and long life for your pond.

If your irrigation pond is filled by a cold-water well it is usually best to use the same pipe for the inlet and outlet or place the pipes side by side rather than on opposite sides of the pond. With this arrangement there is little water movement except around the inlet. Thus the water away from the inlet rises and falls, but the change in temperature is more gradual and not so much fish food is flushed out.

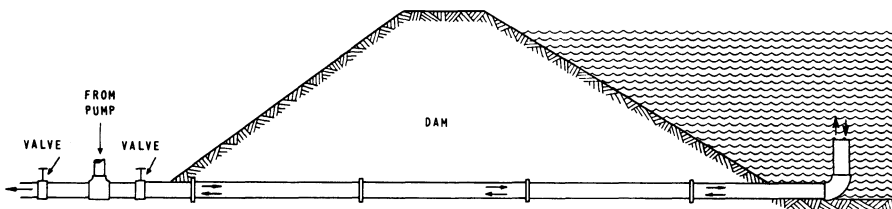
Of course, you must make sure that sufficient water is left in the irrigation pond at all times to maintain the fish. Also be sure to fill your pond promptly after drawdown and to keep it full through the nonirrigating parts of the year.

The water for trout ponds must have an oxygen content of 5 p.p.m. or above throughout the year. Likely, you will not have to test this because most cool- and cold-water ponds have enough oxygen. The water should be free from heavy silt, pollution, and noxious gases. It should be within an acidity-alkalinity range of pH 6.5 to 9. However,

trout may survive ranges as low as pH 4.5 or as high as 10 if the change is not abrupt. Your State fish and game agency, agricultural college, or Soil Conservation Service technician can give you this information for your pond.

Water from springs or wells frequently is low in oxygen, and it may be charged with carbon dioxide or other harmful gases. Running the water over rocks or baffles reduces carbon dioxide and some of the other gases and adds oxygen.

There is no fixed or easy rule for finding out whether the water in your pond will support trout. If you have a large pond, one way is to put a screened box, commonly called a "live box," containing a few healthy trout in the pond for a few days. If temperature is questionable, make your "live box" test during hot weather. If your pond appears favorable and is not more than an acre in size, you can check it by stocking the desired number and kinds of trout.



This arrangement for an irrigation pond permits drawing water from the pond, from the well, or from both. The riser in the pond prevents complete drainage by accident. The riser needs a support to keep it in place and a guard to keep out trash.

Weed Control

A few weeds do no harm in a trout pond and may be beneficial. However, if weeds are abundant over the whole pond they may make an otherwise good pond almost worthless for fishing.

Weeds in the water and along the bank interfere with fishing. When dead waterweeds decompose, they use oxygen. This is one cause of summer dieoffs and winterkill of trout. Also, some weeds give a musky flavor to trout.

To cope with waterweed problems, build the pond deep and make the shore slope abruptly—about 3 to 1.

In spite of this precaution, you still may have weed problems. Seedling cattails and bulrushes may start at the waterline. The simplest control is to pull them by hand when they appear. You can mow weeds that grow above the waterline or control them with weed sprays.

For underwater weeds, you may use one of several types of power cutters or chemical weedkillers, but weeds will grow again.

Some weed sprays kill fish food and may kill fish unless used strictly according to instructions.

If it is not feasible to control weeds in your entire pond, you can clear strips or fishing holes. You can do this with a scythe, or with a hand

rake with a rope attached to the handle. You can spot treat with chemicals, or lay tar paper or sheets of plastic from the shore out to deep water. Hold the tar paper or plastic sheets in place by old pipes attached to the ends, by rocks or earth, or by stakes.

Ponds in some areas may be bothered with filamentous algae which grow in the water and make a floating blanket of greenish scum on the surface. Sometimes the growth underwater or on the surface is so dense that fishing is impossible.

Usually you can control algae and the related muskgrass (*Chara*) with copper sulfate, commonly called bluestone or blue vitriol. If algae growth is abundant, treat only a fourth or a third of the pond at one time to reduce the danger from decomposing dead algae. One and one-half pounds of copper sulfate to 1 acre-foot of water, about 0.5 p.p.m., will kill most of the algae and muskgrass in neutral or acid waters. Two or three times that much may be needed in alkaline water. A few trials will show how much you need in your pond. Repeated use may lower your fish food; overuse may kill your fish.

Information on locally adapted chemicals for waterweed control is available from your County agricultural agent, your Soil Conservation Service technician, or your State fish

and game agency. Another method of controlling underwater weeds is the use of fertilizer.

Fertilizing

Fertilizer provides nutrients for the microscopic plants that create the bloom which colors the water greenish or brownish. This bloom shuts out the sunlight and helps to prevent the growth of rooted underwater plants.

As a second value, fertilizer usually increases the growth of fish food. The amount of food increase depends on the natural fertility of the water.

If you want to fertilize to control weeds or to increase fish production in an infertile pond, use the following guides:

1. Apply 8 pounds of available nitrogen and 8 pounds of available phosphate per surface acre per application. In areas low in potash, you may also need 2 to 4 pounds of available potash.

2. Make the first application as soon as the ice on the pond melts in the spring or, in the non-ice areas, about when the crocus bloom.

3. Make additional applications

each week until the water turns greenish or brownish (usually two or three applications).

4. Apply more fertilizer as needed until early summer.

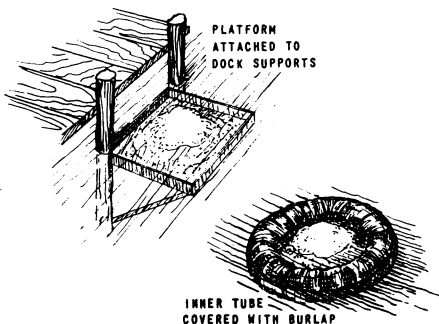
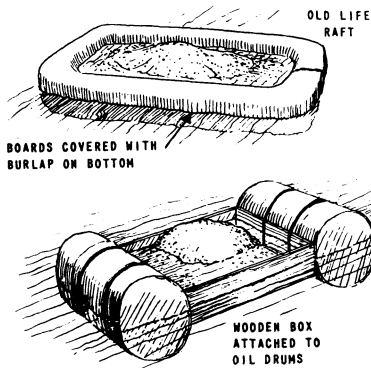
5. Place fertilizer on a floating platform or on a stationary platform just under the surface so that it will dissolve in the surface water.

Fertile water is greenish or brownish. Clear water indicates need for fertilizer. If you can see a white object 18 inches below the surface, more fertilizer is needed.

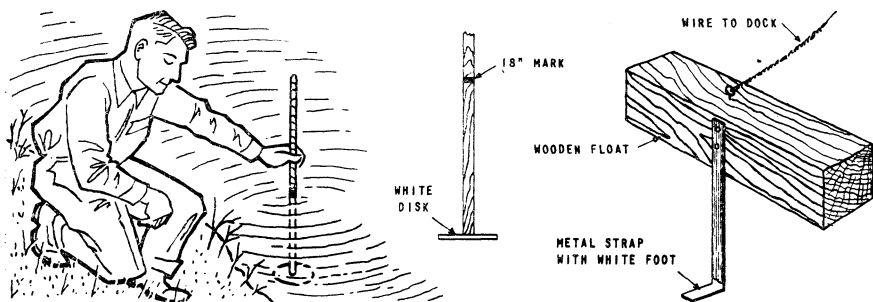
If weeds are already well established, it will be necessary to kill them before applying fertilizer. You can do this with chemicals or by draining the pond and drying the weeds. Start your fertilizing schedule as soon as the water begins to clear after the dead weeds decompose.

Infrequent or haphazard applications of fertilizer often increase weed growth. Don't use any fertilizer unless you are willing to apply enough to establish a bloom in early spring and follow it up with enough applications to maintain the bloom until early summer.

To use fertilizers successfully to keep waterweeds out of your pond,



Floats make efficient use of chemical fertilizer.



Use a float or measuring stick to determine need for fertilizer. If you can see a white object 18 inches below the surface, more fertilizer is needed.

you must have the following conditions:

1. At least 80 percent of the water area in your pond over 3 feet deep. (Bloom will ordinarily not be heavy enough to exclude sunlight in water of less depth.)

2. Little or no continuous flow of water through the pond during spring and summer months. Fertilizing may be practical in a pond with not more than one-fourth second-foot (about 100 gallons per minute) of flow through the pond for each 10 acre-feet of water in it. Greater inflow will carry away too much of your fertilizer. Inflow has less effect on fertility if the outgoing water is drawn from the bottom of the pond as described under the section on trickle tubes.

Cautions:

1. You need to be more careful when using fertilizer in trout ponds than when using it in bass and bluegill ponds because trout require more oxygen than do warm-water fish. The decomposition of microscopic plants (bloom) during hot weather or under the ice reduces the oxygen and may kill your trout.

2. In any area where ice covers the pond a month or more, stop fertilizing in early summer so that the

bloom can decline before the pond freezes over.

3. Use only inorganic (chemical) fertilizer. Organic fertilizer, such as barnyard manure, stimulates the growth of fish food but uses oxygen as it decomposes.

Winterkill

In any area where ice covers the pond a month or more, fish may die from lack of oxygen or from gases trapped under the ice.

The causes of winterkill may be reduced or removed by the following measures:

1. Deepen your pond to at least 10 feet if it has no winter inflow. Fourteen to sixteen feet may be necessary where temperatures fall much below zero.

2. Keep vegetation out. Vegetation decomposing under the ice uses up oxygen and releases other gases.

3. Provide some inflow of water during winter if you can. This is the surest way to provide oxygen. If you have pump water, run the pump a few hours each week to break the ice loose from the shoreline. The pipe from the pump must enter the water under the ice.

4. If you are using fertilizer, don't apply it after mid-July.

Note: Cutting holes in the ice is of questionable value. Holes do not admit much oxygen and quickly freeze over.

Stocking and harvesting the same year

If these corrective measures are not feasible and winterkill continues, you can produce trout by stocking 200 to 300 fingerlings to the acre in the spring, usually March or April. Drain the pond and harvest all fish just before the winter freezeup. In most areas this gives trout 6 to 8 months of growth. If your pond is reasonably fertile, trout should reach 8 to 10 inches in that time. This procedure will not provide much sport fishing, but will supply you with frozen trout for winter use. This practice is not legal in some States.

Commercial Production of Trout

Few farmers and ranchers have the technical knowledge or facilities to successfully grow trout commercially. The margin of profit is not great at best, and the opportunities for failure are many. Before you invest your money, consider the following essentials:

1. A minimum, dependable flow of 2 second-feet (about 900 gallons per minute) of water. The larger fish farms have considerably more. A large flow of water is the key to a good oxygen supply and to prevention of disease. It takes about 3½ second-feet (1,500+ gallons per minute) to produce 50,000 market-size trout (15,000 pounds) annually.

2. Water temperature should be between 52° and 62° F. Water

below 52° F. results in poor growth. Water above 62° F. increases the hazards of disease and oxygen shortage.

3. Water should have a pH between 7 and 8.5. In commercial troughs or ponds where large numbers of fish are grown, water temperature and pH are more critical than in farm and ranch ponds.

4. Spring water is almost essential. The quantity and quality of water available is a rough gauge of the number of trout that can be raised.

5. The site must be free from hazards of floods and muddy water and free from pollution from mines, factories, and cities. Locations on drainages below other fish hatcheries increase the disease hazard.

6. There must be a dependable road to the site. If the road is likely to be closed by snow or high water, you may lose trout due to inability to harvest and feed them or give other necessary attention.

7. There must be control of the water in each trough, flume, or pond individually so as to permit draining, harvesting the fish, cleaning, and refilling.

If you have favorable conditions and want to produce fish commercially, visit private, State, and Federal fish hatcheries to get information on water supplies, physical setup of the plant, feeding, disease control, and marketing. Some States have private fishery consultants who can provide valuable assistance. You can get their names from your State fish and game agency. A few months' employment at a hatchery to get first-hand experience is almost essential.

POINTS TO REMEMBER

- Build the pond that is right for your needs, soil, water supply, and climate.
- A good, small pond gives more satisfaction than an inferior large pond.
- Have as little water as possible that is less than 3 feet deep.
- Keep waterweeds under control.
- Run no more water through the pond than is necessary to maintain water level and proper temperature.
- Be sure your pond is free of other fish before stocking fingerling trout.
- Don't overstock.
- Restock as often as needed, at least every second year.
- Keep the bank and shore free of tall weeds and brush so that fishing will be a pleasure.
- Avoid use of insecticides on the watershed or near the pond. Most of them will kill fish.
- Start fishing as soon as your trout are big enough to eat—don't let them die of old age.
- If you see many fish swimming near the surface, add water immediately, if possible. It usually is a sign they need oxygen. This may happen on hot, still days, on cloudy days, or if the water gets too low.

FISH AND WATER LAWS

Laws and regulations for private fishponds vary widely from State to State. Check with your State fish and game agency about those that may affect your operation. Also, State laws on water storage vary greatly. Your State engineer or water authority can advise you on this.